$$\frac{e_2}{R_3}$$

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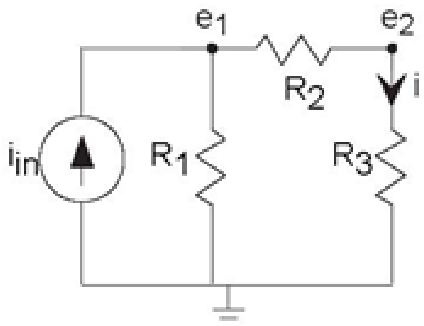

Figure 3.34 circuit example

The presence of a current source in the circuit does not afect the node method greatly; just include it in writing KCL equations as a current **leaving** the node. The circuit has three nodes, requiring us to define two node voltages. The node equations are

$$\frac{e_1}{R_1} + \frac{e_1 - e_2}{R_2} - i_{in} = 0$$

(Node 1)

$$\frac{e_2 - e_1}{R_2} + \frac{e_2}{R_3} = 0$$

(Node 2)

Note that the node voltage corresponding to the node that we are writing KCL for enters with a positive sign, the others with a negative sign, and that the units of each term is given in amperes. Rewrite these equations in the standard set-of-linear-equations form.

$$e_1 \left(\frac{1}{R_1} + \frac{1}{R_2}\right) - e_2 \frac{1}{R_2} = i_{in}$$

$$(e_1) \frac{1}{R_2} + e_2 \left(\frac{1}{R_2} + \frac{1}{R_3}\right) = 0$$

Solving these equations gives

$$e_1 = \frac{R_2 + R_3}{R_3} e_2$$

$$e_2 = \frac{R_1 R_3}{R_1 + R_2 + R_3} i_i n$$

To find the indicated current, we simply use

$$i = \frac{e_2}{R_3}$$

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